

Attorney Docket No. 250270US2S DIV
Inventor: Kentaro NAKAJIMA et al
Preliminary Amendment filed: March 12, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-24 (Cancelled)

25. (Original) A method of manufacturing a magnetic memory device having a memory cell portion and a peripheral circuit portion, comprising:

forming a first metal material film in each of the memory cell portion and the peripheral circuit portion;

forming a magnetoresistive effect film on the first metal material film in each of the memory cell portion and the peripheral circuit portion;

forming a cap film on the magnetoresistive effect film in each of the memory cell portion and the peripheral circuit portion;

forming a first cap layer by patterning the cap film of the memory cell portion into a first shape, and forming a second cap layer by patterning the cap film of the peripheral circuit portion into a second shape;

forming a first magnetoresistive effect element which functions as a memory element by patterning the magnetoresistive effect film of the memory cell portion into the first shape by using the first cap layer, and forming a second magnetoresistive effect element which functions as a dummy by patterning the magnetoresistive effect film of the peripheral circuit portion into the second shape by using the second cap layer;

forming a first metal layer by patterning the first metal material film of the memory cell portion into a third shape, and forming a second metal layer by patterning the first metal material film of the peripheral circuit portion into a fourth shape;

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forming a first insulating film on the first and second cap layers and the first and second metal layers in each of the memory cell portion and the peripheral circuit portion;
flattening the first insulating film; and
removing the first insulating film until a surface of the first cap layer is exposed.

26. (Original) The method of manufacturing a magnetic memory device according to claim 25, wherein the fourth shape is approximately the same as the second shape.

27. (Original) The method of manufacturing a magnetic memory device according to claim 25, further comprising forming a second insulating film on a exposed surface of the second cap layer and the first insulating film only in the peripheral circuit portion.

28. (Original) The method of manufacturing a magnetic memory device according to claim 25, wherein the first and second cap layers are formed of conductive films and are used as contacts.

29. (Original) The method of manufacturing a magnetic memory device according to claim 25, further comprising:

forming a first hard mask having the first shape on the cap film in the memory cell portion;

forming a second hard mask having the second shape on the cap film in the peripheral circuit portion;

patterning the cap film by using the first and second hard masks; and
removing the first and second hard masks.

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30. (Original) The method of manufacturing a magnetic memory device according to claim 29, wherein the first and second hard masks are insulating films.

31. (Original) The method of manufacturing a magnetic memory device according to claim 25, wherein a plurality of the second magnetoresistive effect elements are formed on at least a part of the peripheral circuit portion, and a sum total of occupying areas of the plurality of the second magnetoresistive effect elements is 5% to 80% of the peripheral circuit portion.

32. (Original) The method of manufacturing a magnetic memory device according to claim 31, wherein an occupying area of the second magnetoresistive effect element is approximately equal to that of the first magnetoresistive effect element.

33. (Original) The method of manufacturing a magnetic memory device according to claim 25, wherein a plurality of the second magnetoresistive effect elements are formed on the whole of the memory cell portion, and a sum total of occupying areas of the plurality of the second magnetoresistive effect elements is 5% to 80% of a predetermined area arbitrarily selected from the peripheral circuit portion.

34. (Original) The method of manufacturing a magnetic memory device according to claim 33, wherein an occupying area of the second magnetoresistive effect element is equal to that of the first magnetoresistive effect element.

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35. (Original) The method of manufacturing a magnetic memory device according to claim 25, wherein a plurality of the second magnetoresistive effect elements are formed on the entire memory chip, a sum total of occupying areas of a plurality of the first magnetoresistive effect elements and the plurality of second magnetoresistive effect elements is 5% to 80% of a predetermined area arbitrarily selected from the memory chip.